Space and Defense Infrastructure

Office of Nuclear Energy
U.S. Department of Energy

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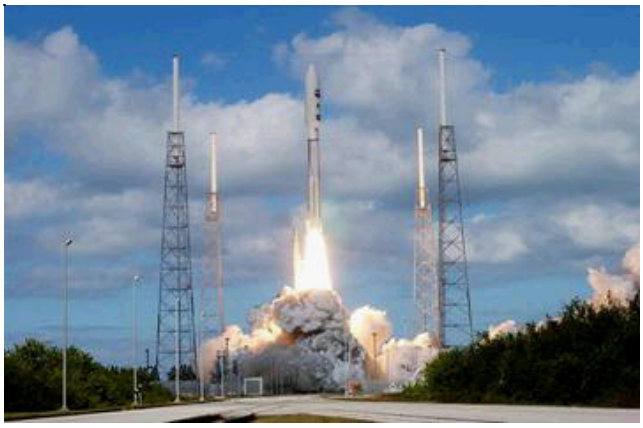
Background

The Department of Energy and its predecessors have provided radioisotope power systems (RPS) for use in space exploration and national security for more than four decades. These systems have been proven safe, reliable, and maintenance free and are capable of producing either heat or electricity for decades under the harsh conditions encountered in deep space. Radioisotope power systems convert the heat from the decay of the radioactive isotope plutonium-238 (Pu-238), a type of plutonium that is not usable for nuclear weapons) into electricity. One type of radioisotope power system is a Radioisotope Thermoelectric Generator (RTG). These systems are ideal for applications where solar panels cannot supply adequate power—such as for spacecraft surveying planets far from the sun, e.g., the Galileo mission to Jupiter, the Cassini mission orbiting Saturn, and the recently launched New Horizons mission to Pluto. The Department also provides Radioisotope Heater Units (RHUs) for space use. These RHUs use the heat generated by Pu-238 to keep a spacecraft's instruments warm and within their designed operating temperatures.

The National Aeronautics and Space Administration's (NASA) New Horizons spacecraft was launched on January 19, 2006. The fastest spacecraft to ever leave Earth, the New Horizons spacecraft will journey three billion miles to study Pluto and its moon Charon in 2015, and may go on to study one or more objects in the vast Kuiper Belt, the largest structure in our planetary system. The Department of Energy (DOE) supplied the RTG that provides electrical power and heat to the spacecraft and its science instruments.



New Horizons launched on January 19, 2006.

In July of 2004, the Cassini mission entered the orbit of Saturn. Launched in October of 1997, the Cassini spacecraft uses three DOE-supplied RTGs and is the largest spacecraft ever launched to explore the outer planets. It is successfully returning data and sending images of Saturn and its surrounding moons using a broad range of scientific instruments. This mission requires RTGs because of the long distance from the sun, which makes the use of solar arrays impractical.

In June and July 2003, NASA launched two rover exploration missions to Mars to explore for evidence of water. The rovers landed at separate sites on Mars in January 2004 and are still exploring Mars, well beyond the planned 90-day mission. Each rover has eight RHUs to keep the rover instruments warm during the cold Martian nights. NASA has also identified several new missions potentially requiring RHUs.

The new, Multi-Mission Radioisotope Thermoelectric Generator (MMRTG) is being developed for use for future missions to the surface of Mars or deep space. A new and efficient Stirling radioisotope generator (SRG) that will require less fuel is also being developed for potential future missions. In addition to developing power sources, the Department supports each mission by preparing a safety analysis report and participating in the launch approval process.

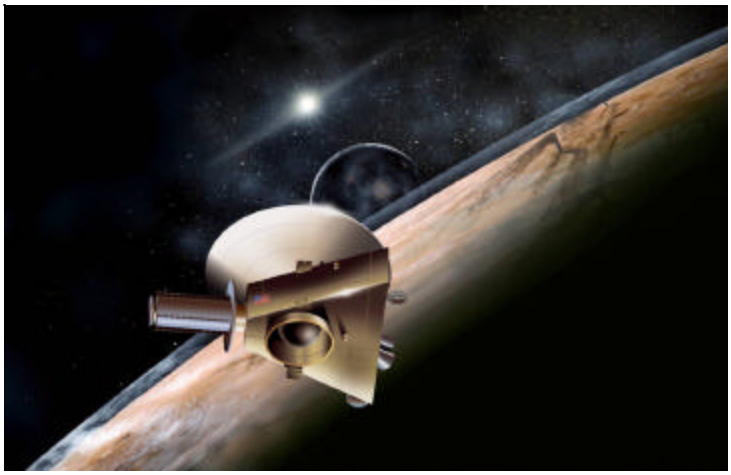
The Department maintains an infrastructure to support the ongoing Space Exploration and National Security missions requirements for RPS. As part of maintaining this infrastructure, the Department is considering the consolidation of all the RPS nuclear operations at the Idaho National Laboratory (INL).

FY 2006 Planned Accomplishments

- Support the January 2006 launch of New Horizons mission to Pluto.
- Complete receipt and storage of Np-237 at INL.
- Resume operation of the bench-scale Pu-238 scrap recovery line at the Los Alamos National Laboratory (LANL).
- Complete the final environmental impact statement for the proposed consolidation of nuclear operations for the production of RPS.
- Complete conceptual evaluations for the proposed consolidation of nuclear operations at INL.

FY 2007 Planned Accomplishments

- Operate the full-scale Pu-238 scrap recovery line at LANL.
- Maintain and operate the Space and Security Power Systems Facility at INL.
- Maintain and use the unique infrastructures at Oak Ridge National Laboratory to fabricate iridium cladding material and test high-strength materials for future space and national security missions.



Artist's rendention of New Horizon's Mission to Pluto

Program Budget
Space and Defense Infrastructure
($ in Millions)

FY 2006	FY 2007
Adj. Approp.	Request
$39.3	$30.7

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